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1991 Thermal Remediation Industry Contractor Survey

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INTRODUCTION

This is the fifth in a series of summaries on the thermal remediation industry.¹⁻⁴ These summaries are developed from an annual survey of the contractors using mobile and/or transportable thermal treatment equipment to remediate contaminated soils. The previous surveys included information on contractor experience, contractor equipment, and equipment performance data. This paper includes the same types of data as previous papers, as well as new information on the type of regulatory program under which each project was conducted. This paper also includes a summary of treatment cost data for publicly funded thermal remediation projects.

Projected total remediation costs for all remediation technologies for the Superfund market segment range from \$100 to \$200 billion, with much of the total coming from Department of Energy sites.³ UST remediation costs have been estimated by the Environmental Protection Agency (EPA) at about \$30 billion. Costs for The RCRA Corrective Action, real estate transfer and spill cleanup remediation market segments are very difficult to estimate because of the relative lack of regulatory definition in these programs on a nationwide basis and because of the potential for regulatory change, particularly in the RCRA Corrective Action program.

MARKET BASIS

The following six major contaminated soil market segments have utilized mobile thermal treatment services to varying degrees:

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA - Superfund)
- Resource Conservation and Recovery Act (RCRA) Corrective Actions
- RCRA Closures
- Real Estate Transfers
- Spill Cleanups
- Underground Storage Tanks (USTs).

Each of these market segments are controlled by different sets of regulatory requirements, which have resulted in widely different performance standards, cleanup standards, and costs.

Previous surveys included contractors involved in the remediation of soils from all six of the market segments listed above. For the first time, however, this survey does not include information on contractors remediating soils contaminated solely with petroleum hydrocarbons. There are now 40 to 60 specially designed mobile and fixed-base thermal desorption units remediating soils contaminated by petroleum hydrocarbons from leaking USTs and other sources. In addition, there are an estimated 50 to 150 asphalt plants that use aggregate dryers to treat UST soils.⁵ The number of contractors in this market segment has grown so large that it will be covered in a separate series of papers dedicated to this industry.

SURVEY RESULTS

The information in Tables 1 through 5 was obtained directly from thermal treatment contractors. The survey information includes only full-scale thermal remediation projects shown in Table 1, which were contracted, in progress, or completed as of December 1991.

The types of mobile thermal treatment equipment currently used by contractors in the five market segments addressed in this paper are shown in Table 2. The performance data in Table 3 are a combination of measured performance data, where available, or required treatment standards where no test data are available. Table 4 describes the regulatory program under which each project was conducted.

THERMAL REMEDIATION INDUSTRY INFORMATION

Important findings from the contractor survey are summarized below:

- The industry shake-out continues. Ogden Environmental Services has announced that they will discontinue their on-site remediation business.
- Rotary dryer technology continues to evolve. Alloy drums are being used to increase the maximum soil temperatures which these units can achieve.
- As of December 1991, the industry-wide equipment utilization was approximately two-thirds of the available mass processing capacity.
- The trend to high capacity and lower cost machines continues as two contractors have developed transportable high temperature incinerators with nominal capacities of about 50 tons per hour.
- The Land Disposal Restriction variance for contaminated soils and debris will end on May 8, 1992. In some cases, the new land disposal restrictions will probably start to impact the industry as Applicable or Relevant and Appropriate Requirements (ARARs) are implemented at CERCLA sites.

COST DATA

A summary of contract prices for publicly funded thermal remediation projects are presented in Figure 1. These data include projects that were awarded from 1985 through 1991. All bid prices were adjusted to a December 1991 basis by using the Chemical Engineering Plant Cost Index to account for inflation. Thermal treatment unit costs appear to be decreasing as technological improvements, such as high capacity treatment equipment, are implemented.

The cost data represent total turnkey bid prices for projects that incorporated thermal treatment as the major remediation technology. Much of the scatter in the data may be attributed to differences in the total scope of services that are included in the bid price. For example, some projects have required significant costs for factors such as waste excavation, waste dewatering, building cleaning, site demolition, and site restoration.

An attempt was made to relate costs to the heat content of the waste by classifying projects as treating low Btu material (0 to 1,500 Btu/lb), medium Btu material (1,500 to 3,000 Btu/lb), and high Btu material (greater than 3,000 Btu/lb). The data show little correlation between waste Btu value and unit treatment prices.

CONCLUSIONS

Table 5 presents a summary of the current project status of the thermal remediation industry. These data show that at least 44 full-scale thermal remediation projects have been completed or are in progress by 17 contractors. The estimated quantity of material that has or will be processed during these projects is approximately 1,300,000 tons. There are an additional 11 contracted thermal remediation projects, which will process an estimated quantity of 600,000 tons of contaminated material. The total of all completed, in progress, or contracted projects is about 1,900,000 tons. While the data in this paper are considered to be a relatively complete compilation of the full-scale U.S. thermal remediation projects through December 1991, it is possible that additional work has been done that is not included.

The use of thermal equipment produces a treated soil with low organic residuals and therefore minimal future liability. As the land disposal restrictions require more types of waste to be treated and as cleanup criteria become more stringent, it is expected that thermal remediation will be used more extensively for decontaminating soils and sludges.

REFERENCES

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2. J. J. Cudahy and W. L. Troxler, "Thermal Remediation Industry Update - II," paper presented at the Air and Waste Management Association Symposium on the Treatment of Contaminated Soils, Cincinnati, Ohio, February 6, 1990.
3. J. J. Cudahy and W. L. Troxler, "1990 Thermal Remediation Industry Contractor Survey," Journal of Air and Waste Management Association, August 1990, pp. 1178-1182.
4. D. A. Oberacker, J. J. Cudahy, and M. K. Richards, "Remediation of Contaminated Uncontrolled Superfund Sites," paper presented at the 1990 Pacific Basin Conference on Hazardous Waste, Honolulu, Hawaii, November 12-16, 1990.
5. W. L. Troxler, et al, "Thermal Desorption of Petroleum Contaminated Soils," paper presented at the Sixth Annual University of Massachusetts Conference on Hydrocarbon Contaminated Soils, Amherst, Massachusetts, September 23-26, 1991.

TABLE I. SITE DATA

VENDOR	SITE NAME	SITE LOCATION		SOURCE OF CONTAMINATION	PROJECT STATUS	SITE SIZE (TONS)
CANONIE	OTTATI & GOSS	KINGSTON	NH	SOLVENT TREATMENT	FINISHED	8,000
CANONIE	CANON BRIDGEWATER	BRIDGEWATER	MA	SOLVENT RECYCLING	FINISHED	6,500
CANONIE	SOUTH KEARNY	SOUTH KEARNY	NJ	SOLVENT RECYCLING	FINISHED	18,000
CANONIE	MCKIN	GRAY	ME	WASTE TREATMENT AND DISPOSAL	FINISHED	18,000
CHEMICAL WASTE MGT.	RESOLVE	N. DARTMOUTH	MA	CHEMICAL RECLAMATION SITE	CONTRACTED	35,000
CHEMICAL WASTE MGT.	OLD MIDLAND	OLA	AR	WOOD TREATMENT	ONGOING	45,000
CHEMICAL WASTE MGT.	BRIO	HOUSTON	TX	STYRENE TAR RECYCLING FACILITY	CONTRACTED	128,000
ENSCO	UNION CARBIDE	SEADRIFT	TX	RCRA WASTES AND LAGOON SLUDGES	CONTRACTED	100,000
ENSCO	LENZ OIL	LEMONT	IL	WASTE OIL	FINISHED	26,000
ENSCO	SYDNEY MINES	BRANDON	FL	WASTE OIL LAGOON	FINISHED	10,000
ENSCO	NCBC	GULFPORT	MS	HERBICIDE STORAGE	FINISHED	22,000
ENSCO	BRIDGEPORT RENTAL	BRIDGEPORT	NJ	USED OIL RECYCLING	ONGOING	100,000
ENSCO	SMITHVILLE	SMITHVILLE	CANADA	PCB TRANSFORMER LEAKS	ONGOING	15,000
ENVIROTECH	S&S FLYING	MARIANNA	FL	PESTICIDE SPRAY FORMULATION	FINISHED	5,200
ENVIROTECH	MALONE	MALONE	FL	PESTICIDE SPRAY FORMULATION	FINISHED	2,200
QDC ENGINEERING	RUBICON	GEISMAR	LA	CHEMICAL MANUFACTURING	ONGOING	52,000
QDC ENGINEERING	HOESCHT CEL.	SHELBY	NC	LANDFILL TRENCHES	FINISHED	4,600
IT CORPORATION	MOTCO	LAMARQUE	TX	STYRENE TAR DISPOSAL PITS	ONGOING	113,000
IT CORPORATION	CORNHUSKER AAP	GRAND ISLAND	NE	MUNITONS PLANT REDWATER PITS	FINISHED	45,000
IT CORPORATION	LOUISIANA AAP	MINDEN	LA	MUNITONS PLANT REDWATER LAGOON	FINISHED	108,000
IT CORPORATION	SIKES PITS	CROSBY	TX	CHEMICAL WASTE DISPOSAL PITS	ONGOING	341,000
IT CORPORATION	BAYOU BONFOUCA	SLIDELL	LA	WOOD TREATING	CONTRACTED	200,000
KIMMINS	LASALLE	LASALLE	IL	PCB CAPACITOR MANUFACTURING	CONTRACTED	69,000
OGDEN	SWANSON RIVER	KENAI	AK	OIL PIPELINE COMPRESSOR OIL	ONGOING	90,000
OH MATERIALS	GOOSE BAY	GOOSE BAY	CANADA	PCB TRANSFORMER OILS	FINISHED	4,000
OH MATERIALS	TWIN CITY AAP	NEW BRIGHTON	MN	MUNITONS PLANT	FINISHED	2,000
OH MATERIALS	FLORIDA STEEL	INDIANTOWN	FL	STEEL MILL USED OILS	FINISHED	18,000
OH MATERIALS	CONFIDENTIAL	CONFIDENTIAL	KY	TIN SLUDGE LAGOON	FINISHED	7,500
OH MATERIALS	HOOPER SANDS	SOUTH BERWICK	ME	LANDFILL	FINISHED	1,700

TABLE 1. (CONTINUED)

VENDOR	SITE NAME	SITE LOCATION		SOURCE OF CONTAMINATION	PROJECT STATUS	SITE SIZE (TONS)
OH MATERIALS	LINDSLEY LUMBER	DANIA	FL	WOOD TREATMENT	CONTRACTED	10,000
SOILTECH	WIDE BEACH	BRANT	NY	PCB CONTAMINATED ROAD OIL	FINISHED	42,000
SOILTECH	WAUKEGAN HARBOR	WAUKEGAN	IL	MARINE MOTOR MANUFACTURING	ONGOING	23,000
TDI SERVICES	CHEVRON REFINERY	EL SEGUNDO	CA	API AND LAGOON SLUDGES	ONGOING	30,000
THERMODYNAMICS CORP	S. CROP SERVICES	DELRAY BEACH	FL	CROP DUSTING OPERATION	FINISHED	1,800
VERTAC SITE CONTRACTOR	VERTAC	JACKSONVILLE	AR	CHEMICAL MANUFACTURING	ONGOING	8,500
VESTA	NYANZA	ASHLAND	MA	DYE MANUFACTURING	FINISHED	1,000
VESTA	ROCKY BOY	HAVRE	MT	WOOD TREATMENT	FINISHED	1,800
VESTA	S. CROP SERVICES	DELRAY BEACH	FL	CROP DUSTING OPERATION	FINISHED	1,800
VESTA	AMERICAN CROSSARM	CHEHALIS	WA	WOOD TREATMENT	FINISHED	900
VESTA	FORT A.P. HILL	BOWLING GREEN	VA	ARMY BASE	FINISHED	200
VESTA	BLACK FEET POLE	BROWNING	MT	WOOD TREATMENT	FINISHED	2,000
VESTA	WRIGHT PATTERSON	DAYTON	OH	AIR FORCE BASE	CONTRACTED	
WESTINGHOUSE/HAZTECH	PEAK OIL	TAMPA	FL	USED OIL RECYCLING	FINISHED	7,000
WESTINGHOUSE/HAZTECH	LASALLE	LASALLE	IL	TRANSFORMER RECONDITIONING	FINISHED	30,000
WESTON	TINKER AFB	OKLAHOMA CITY	OK	AIR FORCE BASE	FINISHED	1,000
WESTON	PAXTON AVENUE	CHICAGO	IL	WASTE LAGOON	FINISHED	16,000
WESTON	LAUDER SALVAGE	BEARDSTOWN	IL	METAL SCRAP SALVAGE	FINISHED	8,500
WESTON	SAVANNA AAP	SAVANNA	IL	RED/PINK WATER LAGOONS	CONTRACTED	25,000
WESTON	ALABAMA AAP	CHILDERSBURG	AL	MULTIPLE PLANT LOCATIONS	CONTRACTED	25,000
WESTON	ANDERSON DEV CO	ADRIAN	MI	WASTE LAGOON	ONGOING	3,000
WESTON	LASKIN POPLAR	JEFFERSON	OH	WASTE OIL	CONTRACTED	13,500
WILLIAMS INCIN. SERVS.	BOG CREEK	HOWELL TWP.	NJ	PAINT/SOLVENT DISPOSAL	FINISHED	22,000
WILLIAMS INCIN. SERVS.	PRENTISS CREOSOTE	PRENTISS	MS	WOOD TREATMENT	FINISHED	9,000
WILLIAMS INCIN. SERVS.	LETTERKENNEY	CHAMBERSBURG	PA	VOLATILE ORGANICS	ONGOING	25,000
WILLIAMS INCIN. SERVS.	CONFIDENTIAL	CONFIDENTIAL	NY	VOLATILE ORGANICS	CONTRACTED	6,500

TABLE 2. EQUIPMENT DATA

VENDOR	SITE NAME	COMBUSTION EQUIPMENT TYPE	THERMAL CAPACITY (MM BTU/HR)	APC EQUIPMENT TYPE
CANONIE	OTTATI & GOSS	ROTARY DRYER	55	BAGHOUSE, SCRUBBER
CANONIE	CANON BRIDGEWATER	ROTARY DRYER	55	BAGHOUSE, SCRUBBER
CANONIE	SOUTH KEARNY	ROTARY DRYER	55	BAGHOUSE, SCRUBBER
CANONIE	MCKIN	ROTARY DRYER	55	BAGHOUSE, SCRUBBER
CHEMICAL WASTE MGT.	RESOLVE	HIGH TEMPERATURE INDIRECT	21	CONDENSATION, CARBON
CHEMICAL WASTE MGT.	OLD MIDLAND	ROTARY KILN	82	CYCLONE, BAGHOUSE, PACKED BED
CHEMICAL WASTE MGT.	BRIO	ROTARY KILN	82	CYCLONE, BAGHOUSE, PACKED BED
ENSCO	UNION CARBIDE	ROTARY KILN	50	STEAM EJECTOR SCRUBBER
ENSCO	LENZ OIL	ROTARY KILN	50	STEAM EJECTOR SCRUBBER
ENSCO	SYDNEY MINES	ROTARY KILN	50	STEAM EJECTOR SCRUBBER
ENSCO	NCBC	ROTARY KILN	50	STEAM EJECTOR SCRUBBER
ENSCO	BRIDGEPORT RENTAL	ROTARY KILN	90	STEAM EJECTOR SCRUBBER
ENSCO	SMITHVILLE	ROTARY KILN	50	STEAM EJECTOR SCRUBBER
ENVIROTECH	S&S FLYING	ROTARY DRYER	72	CYCLONE, VENTURI
ENVIROTECH	MALONE	ROTARY DRYER	72	CYCLONE, VENTURI
GDC ENGINEERING	RUBICON	INFRARED CONVEYOR FURNACE	30	COLLISION SCRUBBER
GDC ENGINEERING	HOESCHT CEL.	ROTARY KILN	20	BAGHOUSE, WET SCRUBBER
IT CORPORATION	MOTCO	ROTARY KILN	60	HYDROSONICS TANDEM SCRUBBER
IT CORPORATION	CORNHUSKER AAP	ROTARY KILN	60	HYDROSONICS TANDEM SCRUBBER
IT CORPORATION	LOUISIANA AAP	ROTARY KILN	60	HYDROSONICS TANDEM SCRUBBER
IT CORPORATION	SIKES PITS	ROTARY KILN	120	HYDROSONICS TANDEM SCRUBBER
IT CORPORATION	BAYOU BONFOUCA	ROTARY KILN	60	HYDROSONICS TANDEM SCRUBBER
KIMMINS	LASALLE	ROTARY KILN	100	BAGHOUSE, PACKED BED
OGDEN	SWANSON RIVER	CIRCULATING FLUID BED	10	BAGHOUSE
OH MATERIALS	GOOSE BAY	INFRARED CONVEYOR FURNACE	30	VENTURI, PACKED BED
OH MATERIALS	TWIN CITY AAP	INFRARED CONVEYOR FURNACE	30	VENTURI, PACKED BED
OH MATERIALS	FLORIDA STEEL	INFRARED CONVEYOR FURNACE	30	VENTURI, PACKED BED
OH MATERIALS	CONFIDENTIAL	ROTARY DRYER	20	CYCLONE, VENTURI
OH MATERIALS	HOOVER SANDS	ROTARY DRYER	20	CYCLONE, VENTURI

TABLE 2. (CONTINUED)

VENDOR	SITE NAME	COMBUSTION EQUIPMENT TYPE	THERMAL CAPACITY (MM BTU/HR)	APC EQUIPMENT TYPE
OH MATERIALS	LINDSLEY LUMBER	INFRARED CONVEYOR FURNACE	30	VENTURI, PACKED BED
SOILTECH	WIDE BEACH	HIGH TEMPERATURE INDIRECT	14	BAGHOUSE, CYCL., SCRUBBER, CARBON
SOILTECH	WAUKEGAN HARBOR	HIGH TEMPERATURE INDIRECT	14	BAGHOUSE, CYCL., SCRUBBER, CARBON
TDI SERVICES	CHEVRON REFINERY	HIGH TEMPERATURE INDIRECT		CONDENSATION, CARBON
THERMODYNAMICS CORP	S. CROP SERVICES	ROTARY KILN	7	WET SCRUBBER
VERTAC SITE CONTRACTOR	VERTAC	ROTARY KILN	35	SPRAY DRYER, BAGHOUSE, SCRUBBER
VESTA	NYANZA	ROTARY KILN	8	WET SCRUBBER
VESTA	ROCKY BOY	ROTARY KILN	12	WET SCRUBBER
VESTA	S. CROP SERVICES	ROTARY KILN	12	WET SCRUBBER
VESTA	AMERICAN CROSSARM	ROTARY KILN	12	WET SCRUBBER
VESTA	FORT A.P. HILL	ROTARY KILN	12	WET SCRUBBER
VESTA	BLACK FEET POLE	ROTARY KILN	12	WET SCRUBBER
VESTA	WRIGHT PATTERSON	ROTARY KILN	25	WET SCRUBBER
WESTINGHOUSE/HAZTECH	PEAK OIL	INFRARED CONVEYOR FURNACE	30	WET SCRUBBER
WESTINGHOUSE/HAZTECH	LASALLE	INFRARED CONVEYOR FURNACE	30	WET SCRUBBER
WESTON	TINKER AFB	LOW TEMPERATURE INDIRECT	12	BAGHOUSE, WET SCRUBBER, CARBON
WESTON	PAXTON AVENUE	ROTARY KILN	35	BAGHOUSE, PACKED BED
WESTON	LAUDER SALVAGE	ROTARY KILN	35	BAGHOUSE, PACKED BED
WESTON	SAVANNA AAP	ROTARY KILN	35	BAGHOUSE, PACKED BED
WESTON	ALABAMA AAP	ROTARY KILN	35	BAGHOUSE, PACKED BED
WESTON	ANDERSON DEV CO	LOW TEMPERATURE INDIRECT	12	BAGHOUSE, WET SCRUBBER, CARBON
WESTON	LASKIN POPLAR	ROTARY KILN	35	BAGHOUSE, PACKED BED
WILLIAMS INCIN. SERVS.	BOG CREEK	ROTARY KILN	82	CYCLONE, BAGHOUSE, PACKED BED
WILLIAMS INCIN. SERVS.	PRENTISS CREOSOTE	ROTARY KILN	82	CYCLONE, BAGHOUSE, PACKED BED
WILLIAMS INCIN. SERVS.	LETTERKENNEY	ROTARY DRYER	65	BAGHOUSE
WILLIAMS INCIN. SERVS.	CONFIDENTIAL	ROTARY DRYER	65	BAGHOUSE

TABLE 3. PERFORMANCE DATA

VENDOR	SITE NAME	INDICATOR COMPOUND	CONTAMINANT	TRIAL	PARTICULATE	RCRA	TSCA
			CONCENTRATION IN TREATED SOIL. (mg/kg)		EMISSIONS (GR/DSCF @ 7% O2)		
				BURN REQUIRED		PERMIT	PERMIT
CANONIE	OTTATI & GOSS	VOLATILE ORGANICS	< 0.2	YES	0.03	NO	NO
CANONIE	CANON BRIDGEWATER	TOTAL VOC	< 0.1	NO		NO	NO
CANONIE	SOUTH KEARNY	VOLATILE ORGANICS		NO		NO	NO
CANONIE	MCKIN	TRICHLOROETHYLENE	< 0.1	YES	0.03	NO	NO
CHEMICAL WASTE MGT.	RESOLVE	PCBs	< 25	NO		NO	NO
CHEMICAL WASTE MGT.	OLD MIDLAND	TOTAL PNA _s	< 10	YES	0.08	NO	NO
CHEMICAL WASTE MGT.	BRIO			YES	0.08	NO	NO
ENSCO	UNION CARBIDE	RCRA CONSTITUENTS	LDR	YES	0.03	YES	NO
ENSCO	LENZ OIL	HYDROCARBONS	< 5.0	YES	0.006	NO	NO
ENSCO	SYDNEY MINES	HYDROCARBONS	< 5.0	NO	0.08	NO	NO
ENSCO	NCBC	DIOXIN	< 15 ppt	YES	0.017	NO	NO
ENSCO	BRIDGEPORT RENTAL	PCBs	< 2.0	YES	0.03	NO	YES
ENSCO	SMITHVILLE	PCBs	< 5.0	YES	0.03	NO	YES
ENVIROTECH	S&S FLYING	TOXAPIENE	< 0.1	YES	0.015	NO	NO
ENVIROTECH	MALONE	TOXAPIENE	< 0.1	NO		NO	NO
QDC ENGINEERING	RUBICON	MCB ₂ AND DCB ₂	TCLP	YES	0.01	NO	NO
QDC ENGINEERING	HOESCHT CEL.	ETHYLENE GLYCOL	< 1	YES	0.08	NO	NO
IT CORPORATION	MOTCO	PCBs (TCLP EXTRACT)	0.028 mg/l	YES	0.08	NO	NO
IT CORPORATION	CORNHUSKER AAP	TRINITROTOLUENE (TNT)	< 1.3	YES	0.0017	NO	NO
IT CORPORATION	LOUISIANA AAP	TNT	< 1.3	YES	NR	NO	NO
IT CORPORATION	SIKES PITS	TOTAL PNA _s	< 100	YES	0.08	NO	NO
IT CORPORATION	BAYOU BONFOUCA	TOTAL PNA _s	< 10	YES	0.08	NO	NO
KIMMINS	LASALLE	PCBs	< 2.0	YES	0.001	NO	NO
OGDEN	SWANSON RIVER	PCBs	< 0.1	YES	0.05	NO	YES
OH MATERIALS	GOOSE BAY	PCBs	< 0.5	YES	0.031	NO	YES
OH MATERIALS	TWIN CITY AAP	PCBS	< 2	NO	0.08	NO	YES
OH MATERIALS	FLORIDA STEEL	PCBs	< 2	YES	0.056	NO	YES
OH MATERIALS	CONFIDENTIAL	ORGANIC AND MOISTURE	< 10 %	NO	NR	NO	NO
OH MATERIALS	HOOPER SANDS	DICHLOROBENZENE	< 100	YES	0.03	NO	NO

TABLE 3. (CONTINUED)

VENDOR	SITE NAME	INDICATOR COMPOUND	CONTAMINANT CONCENTRATION IN TREATED SOIL (mg/kg)	TRIAL BURN REQUIRED	PARTICULATE EMISSIONS (GR/DSCF @ 7% O ₂)	RCRA PERMIT	TSCA PERMIT
OH MATERIALS	LINDSLEY LUMBER	PENTACHLOROPHENOL	< 5	YES	0.002	NO	NO
SOILTECH	WIDE BEACH	PCB _s	< 2	YES		NO	NO
SOILTECH	WAUKEGAN HARBOR	PCB _s		YES	0.005	NO	NO
TDI SERVICES	CHEVRON REFINERY	SEE 40 CFR 268	LDR	NO	NR	NO	NO
THERMODYNAMICS CORP	S. CROP SERVICES	PENTACHLOROPHENOL	0.003	YES	0.035	NO	NO
VERTAC SITE CONTRACTOR	VERTAC	DIOXINS - TOXIC EQUIV.	0.4 ppt	YES	0.004	NO	NO
VESTA	NYANZA	NITROBENZENE		YES	0.02	NO	NO
VESTA	ROCKY BOY	DIOXIN, PCP	<0.001, 0.2	YES		NO	NO
VESTA	S. CROP SERVICES	DDT	< 0.2	YES	0.03	NO	NO
VESTA	AMERICAN CROSSARM	DIOXIN	< 0.001	YES	0.011	NO	NO
VESTA	FORT A.P. HILL	DIOXIN	< 0.001	YES	0.02	NO	NO
VESTA	BLACK FEET POLE	DIOXIN, PCP	<0.001, 0.2	YES	0.08	NO	NO
VESTA	WRIGHT PATTERSON	PCB'S, DIOXIN	< 1, <0.001	YES	0.08	NO	NO
WESTINGHOUSE/HAZTECH	PEAK OIL	PCB _s	< 1	YES	0.08	NO	NO
WESTINGHOUSE/HAZTECH	LASALLE	PCB _s	< 2	YES	0.08	NO	NO
WESTON	TINKER AFB	TRICHLOROETHYLENE		NO		NO	NO
WESTON	PAXTON AVENUE	PNA _s AND PCB'S	< 5	YES	0.02	NO	YES
WESTON	LAUDER SALVAGE	PCB _s	< 2	YES	0.02	NO	YES
WESTON	SAVANNA AAP	9 EXPLOSIVES	<1 (EACH)	YES	0.08	NO	NO
WESTON	ALABAMA AAP	9 EXPLOSIVES	<1 (EACH)	YES	0.08	NO	NO
WESTON	ANDERSON DEV CO	CHLOROANILINE DERIVES	< 1.6	YES	0.04	NO	NO
WESTON	LASKIN POPLAR	PCB'S, F'S, K'S	LDR'S	YES	0.0019	NO	NO
WILLIAMS INCIN. SERVS.	BOG CREEK	TOTAL ORGANICS	< 1	YES	0.015	NO	NO
WILLIAMS INCIN. SERVS.	PRENTISS CREOSOTE	TOTAL PNA _s	< 2	YES	0.011	NO	NO
WILLIAMS INCIN. SERVS.	LETTERKENNEY	VOLATILE ORGANICS	< 1	NO	0.04	NO	NO
WILLIAMS INCIN. SERVS.	CONFIDENTIAL	VOLATILE ORGANICS	< 2	YES	0.03	NO	NO
NR - NOT REQUIRED			PCB _s -POLYCHLORINATED BIPHENYLS				
LDR - LAND DISPOSAL RESTRICTIONS			PCP-PENTACHLOROPHENOL				
AS PER 40 CFR 268			MCB ₂ -MONOCHLOROBENZENE				
PNA _s -POLYNUCLEAR AROMATICS			DCB ₂ -DICHLOROBENZENE				

TABLE 4. THERMAL REMEDIATION REGULATORY PROGRAMS

VENDOR	SITE NAME	SITE LOCATION		TYPE OF SITE	PROJECT STATUS	SITE SIZE (TONS)
CANONIE	OTTATI & GOSS	KINGSTON	NH	NPL	FINISHED	8,000
CANONIE	CANON BRIDGEWATER	BRIDGEWATER	MA	NPL	FINISHED	6,500
CANONIE	SOUTH KEARNY	SOUTH KEARNY	NJ	RE TRANSFER	FINISHED	18,000
CANONIE	MCKIN	GRAY	ME	NPL	FINISHED	18,000
CHEMICAL WASTE MGT.	RESOLVE	N. DARTMOUTH	MA	NPL	CONTRACTED	35,000
CHEMICAL WASTE MGT.	OLD MIDLAND	OLA	AR	STATE	ONGOING	45,000
CHEMICAL WASTE MGT.	BRIO	HOUSTON	TX	NPL	CONTRACTED	128,000
ENSCO	UNION CARBIDE	SEADRIFT	TX	RCRA CA	CONTRACTED	100,000
ENSCO	LENZ OIL	LEMONT	IL	NPL	FINISHED	26,000
ENSCO	SYDNEY MINES	BRANDON	FL	NPL	FINISHED	10,000
ENSCO	NCBC	GULFPORT	MS	STATE	FINISHED	22,000
ENSCO	BRIDGEPORT RENTAL	BRIDGEPORT	NJ	NPL	ONGOING	100,000
ENSCO	SMITHVILLE	SMITHVILLE	CANADA		ONGOING	15,000
ENVIROTECH	S&S FLYING	MARIANNA	FL	STATE	FINISHED	5,200
ENVIROTECH	MALONE	MALONE	FL	STATE	FINISHED	2,200
ODC ENGINEERING	RUBICON	GEISMAR	LA	STATE	ONGOING	52,000
GDC ENGINEERING	HOESCHT CEL.	SHELBY	NC	NPL	FINISHED	4,600
IT CORPORATION	MOTCO	LAMARQUE	TX	NPL	ONGOING	113,000
IT CORPORATION	CORNHUSKER AAP	GRAND ISLAND	NE	NPL	FINISHED	45,000
IT CORPORATION	LOUISIANA AAP	MINDEN	LA	NPL	FINISHED	108,000
IT CORPORATION	SIKES PITS	CROSBY	TX	NPL	ONGOING	341,000
IT CORPORATION	BAYOU BONFOUCA	SLIDELL	LA	NPL	CONTRACTED	200,000
KIMMINS	LASALLE	LASALLE	IL	NPL	CONTRACTED	69,000
OGDEN	SWANSON RIVER	KENAI	AK		ONGOING	90,000
OH MATERIALS	GOOSE BAY	GOOSE BAY	CANADA		FINISHED	4,000
OH MATERIALS	TWIN CITY AAP	NEW BRIGHTON	MN	NPL	FINISHED	2,000
OH MATERIALS	FLORIDA STEEL	INDIANTOWN	FL	NPL	FINISHED	18,000
OH MATERIALS	CONFIDENTIAL	CONFIDENTIAL	KY		FINISHED	7,500
OH MATERIALS	HOOPER SANDS	SOUTH BERWICK	ME	CERCLA RA	FINISHED	1,700

(CONTINUED)

TABLE 4. (CONTINUED)

VENDOR	SITE NAME	SITE LOCATION		TYPE OF SITE	PROJECT STATUS	SITE SIZE (TONS)
OH MATERIALS	LINDSLEY LUMBER	DANIA	FL	CERCLA RA	CONTRACTED	10,000
SOILTECH	WIDE BEACH	BRANT	NY	NPL	FINISHED	42,000
SOILTECH	WAUKEGAN HARBOR	WAUKEGAN	IL	NPL	ONGOING	23,000
TDI SERVICES	CHEVRON REFINERY	EL SEGUNDO	CA	RCRA CA	ONGOING	30,000
THERMODYNAMICS CORP	S. CROP SERVICES	DELRAY BEACH	FL	STATE	FINISHED	1,800
VERTAC SITE CONTRACTOR	VERTAC	JACKSONVILLE	AR	NPL	ONGOING	8,500
VESTA	NYANZA	ASHLAND	MA	NPL	FINISHED	1,000
VESTA	ROCKY BOY	HAVRE	MT	STATE	FINISHED	1,800
VESTA	S. CROP SERVICES	DELRAY BEACH	FL	STATE	FINISHED	1,800
VESTA	AMERICAN CROSSARM	CHEHALIS	WA	CERCLA RA	FINISHED	900
VESTA	FORT A.P. HILL	BOWLING GREEN	VA	STATE	FINISHED	200
VESTA	BLACK FEET POLE	BROWNING	MT	NPL	FINISHED	2,000
VESTA	WRIGHT PATTERSON	DAYTON	OH	NPL	FINISHED	
WESTINGHOUSE/HAZTECH	PEAK OIL	TAMPA	FL	NPL	FINISHED	7,000
WESTINGHOUSE/HAZTECH	LASALLE	LASALLE	IL	NPL	FINISHED	30,000
WESTON	TINKER AFB	OKLAHOMA CITY	OK	NPL	FINISHED	1,000
WESTON	PAXTON AVENUE	CHICAGO	IL	STATE	ONGOING	16,000
WESTON	LAUDER SALVAGE	BEARDSTOWN	IL	STATE	FINISHED	8,500
WESTON	SAVANNA AAP	SAVANNA	IL	NPL	CONTRACTED	25,000
WESTON	ALABAMA AAP	CHILDERSBURG	AL	NPL	CONTRACTED	25,000
WESTON	ANDERSON DEV CO	ADRIAN	MI	NPL	ONGOING	3,000
WESTON	LASKIN POPLAR	JEFFERSON	OH	NPL	CONTRACTED	13,500
WILLIAMS INCIN. SERVS.	BOG CREEK	HOWELL TWP.	NJ	NPL	FINISHED	22,500
WILLIAMS INCIN. SERVS.	PRENTISS CREOSOTE	PRENTISS	MS	NPL	FINISHED	9,000
WILLIAMS INCIN. SERVS.	CONFIDENTIAL	CONFIDENTIAL	PA	NPL	ONGOING	25,000
WILLIAMS INCIN. SERVS.	CONFIDENTIAL	CONFIDENTIAL	NY	NPL	CONTRACTED	6,500

NPL-NATIONAL PRIORITIES LIST

STATE-STATE SUPERFUND SITE

RE TRANSFER-REAL ESTATE TRANSFER

RCRA CA-RCRA CORRECTIVE ACTION

CERCLA RA-SUPERFUND REMOVAL ACTION

a

Table 5. Thermal Remediation Industry Project Summary

Description	Finished	On Going	Contracted	Total
No. of Projects	31	13	11	55
Waste Quantity (tons)	436,000	862,000	612,000	1,910,000
Average Site Size (tons) ^b	14,100	66,300	55,600	34,700
No. of Contractors				17
No. of Thermal Units				39

a

Projects through December 1991.

b

Average includes only projects for which site size information is available.

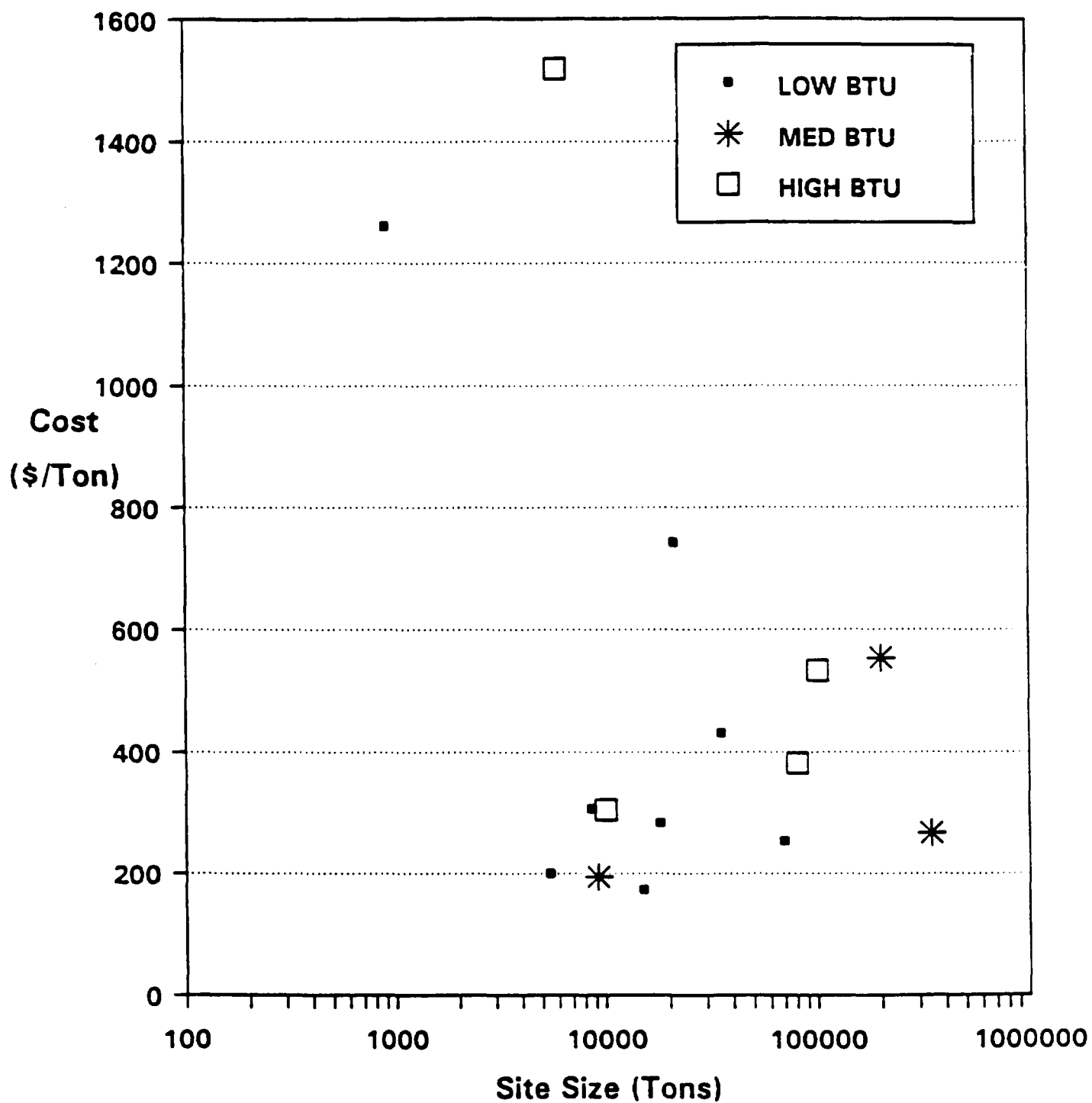


Figure 1. Thermal Remediation Cost Data